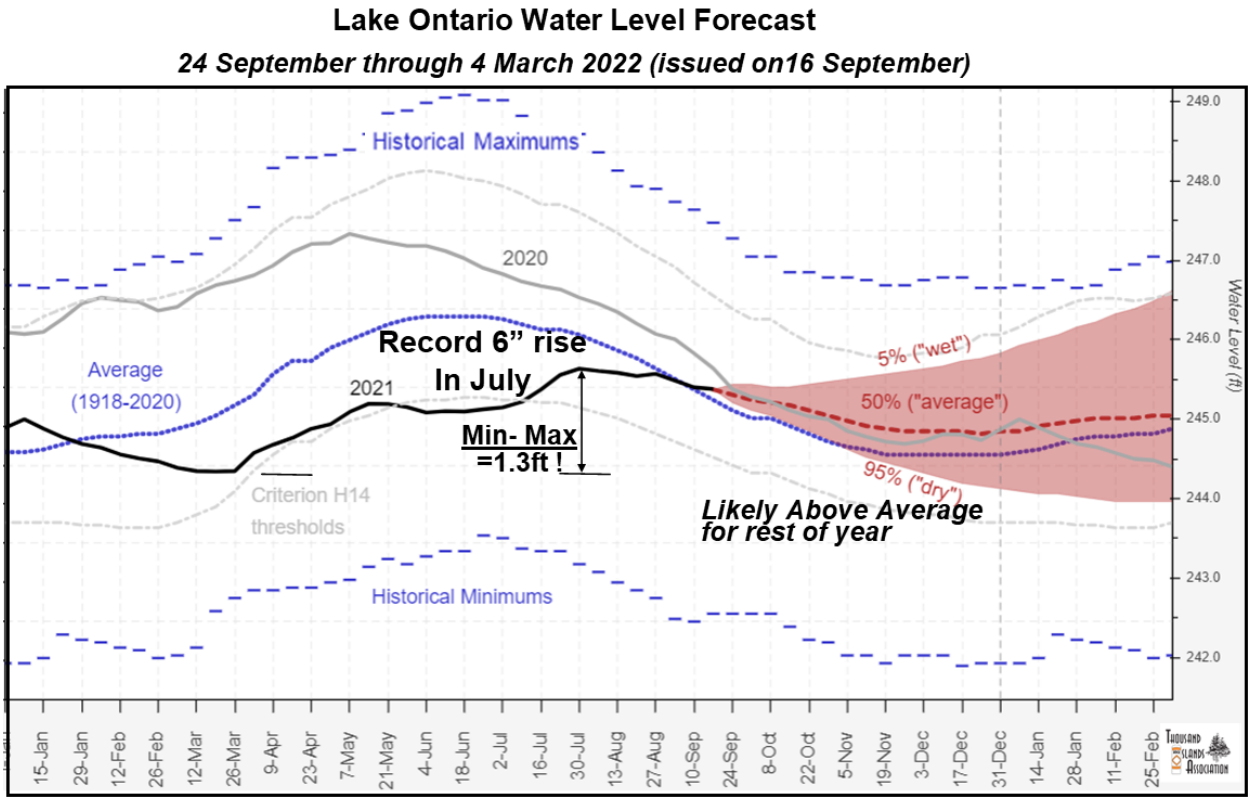
Water Levels Now Near Average

By TIA Water Levels Committee – White, Barton & Stewart [Full Article]

1) Current Level Update with 6 month Forecast

- We're now at slightly above AVERAGE Levels [for this time of year], and likely average or slightly above for the next 6 months
- Levels only rose 1.3 feet this season (Min-to-Max), a near-record low amount
- A 6" rise broke the record for the largest July level increase (was 4.5")



https://www.ijc.org/en/loslrb/watershed/forecasts with additions by TIA (***try out the readout cursor***)

How did we go from very low water conditions to a bit above average (June saw some of the lowest June water levels since the Seaway was built)? After months of low precipitation, July through September turned wet. For the Lake Ontario basin as a whole, July saw 176% of average precipitation, August saw 111% of average precipitation, and September (through the 28th) has seen 138% of average precipitation. Combined with the well-above-average flows we've been receiving from Erie, all that extra precipitation brought Lake/River levels back up to (and a bit above) average over the last three months.

We took a dive into historical data back to 1960 and the early Seaway (called the 'post project' era). It's hard to imagine the following two events happened in the same year.

- 2021 had one of the smallest seasonal water level rises (1.3 feet) from minimum to maximum.

  The smallest seasonal rise actually happened in 1987. Its low point was at 245.93' on 1/17/87, and it hit its max of 246.88' in mid-April (and stayed there for a few days). That's a rise of just 0.95 feet!

  So 2021 isn't the record... but it's definitely up there among the lowest we've seen.

- July 2021 established the Record for the Largest Level Rise in July

  The 6-inch rise in July is definitely the highest in the data going back to 1960. The next highest was a rise of almost 4.5" in 2006. By comparison, the average for July is a DROP of about 3.5".

2) The Challenge of Forecasting - Precipitation, Evaporation & Weather

Introduction – Why are water levels so difficult to predict and control?

We often hear of regulation as being the be-all/end-all for maintaining consistent water levels in the St. Lawrence/Lake Ontario basin....namely from those who do not delve into the information and data available from the many sources out there. We often talk to fellow cottagers, who want to point the finger at someone. As this season draws to a close, folks start looking for *predictions about next spring and summer's water levels*. **Are these predictions possible or a pipedream?**

We have had many discussions over the years on the impact of precipitation vs. regulation, as I suspect many of you have. Often people look out their own window, and to their own experience, to argue that precipitation was "not that unusual". [Some would call this the memory driven *"Recency Effect"*].

However, **we fail to look at the significant impacts across much larger systems**, such as the Lake Ontario (LO) basin or the entire Great Lakes basin. Imagine if the remnants of Hurricane Ida had tracked a mere 50 – 100 miles farther north, thereby dropping its daily record rains into the LO Basin instead of the Hudson Valley? You begin to see why long term predictions, more than a few weeks out, are very difficult to pull together.

We highly encourage all to watch the Sept 9th groundbreaking presentation by Dr. Andrew Gronewold, a noted hydrologist and authority on Great Lakes water levels. It is titled **"The Ups and Downs of Great Lakes Water Levels"**, was sponsored in part by Save The River, was delivered and recorded at The Clayton Opera House.

We think this talk deserves a special focus in TIA's October River Talk article. Ironically it supports and aligns perfectly with this topic we had already chosen for this edition.

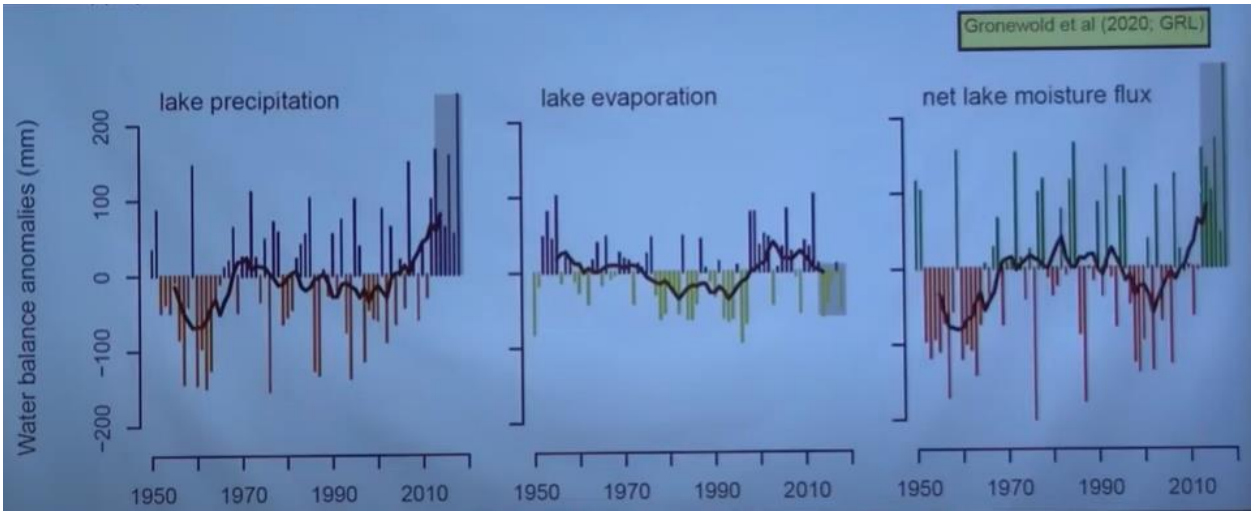
Some Highlights from Gronewold's presentation:

The first half of the talk does an excellent job bounding the topic, problems, and teaching the variables. Gronewald coherently extracts key findings from massive amounts of data, then demonstrates his explanations graphically.

Highlight #1 (~ 28:30 min) – ***What happened in the last several years?***

Precipitation is the largest, often most widely continuously varying component of the Great Lake Basin's water balance. The impact of Evaporation, directly tied to Humidity, Temperature and Wind factors, further amplify both dry and wet extremes.

> To illustrate, Dr Gronewold draws 3 boxes to graphically demonstrate this equation: **Precipitation – Evaporation = Net Lake Moisture Flux**. The data began with the years 1950 through 2014 (the end of Great Lakes recent dry cycle).
>
> He then added 7 more years of data [shaded area in 3 graphs], covering 2014 to 2020, perhaps the wettest period historically for this region.
>
> Next he adds evaporation's impact for those 7 years.
> ***Precip* – [– *Evap*] = yields a *Huge Rise in Net Lake Moisture Flux*.** The resulting record high water levels are shown by the shaded tall green bars. (Of note, the significant negative reduction in evaporation shown in the middle graph, was largely caused by a movement of the Jetstream and an associated polar vortex over the Great Lakes basin)



Gronewold et al (2020, GRL), presented 9/9/21 at the Clayton Opera House
Moisture was supplied most significantly from the following air masses: Seattle area for the Pacific West Maritime Polar (mP), the Gulf of Mexico for the Continental Tropical (cT), and the Atlantic Ocean Maritime Polar (mP) air mass. This explains the record breaking Precipitation enhanced supply in the Lake Ontario basin.

This immense Net Basin Precipitation Supply, plus the massive Incoming Supply flowing from Lake Erie, and the further level rise driven by necessary spring outflow reductions (needed to

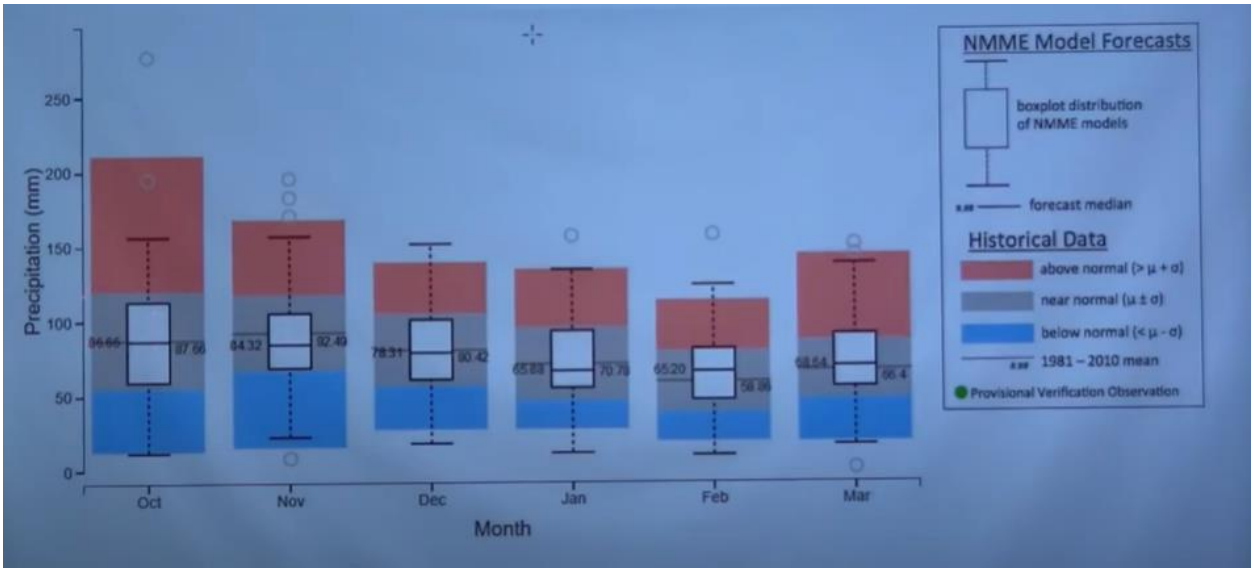
accommodate massive and long duration outflows from the Ottawa River into Montreal), taken together, made for a perfect storm and record flooding in both 2017 & 2019.

Of note: The highest Evaporation occurs when cold, dry air passes over relatively warm water. Did you know that Evaporation has a very significant effect on water levels in the late fall?

Highlight #2 (~ 38:00 min) ***Predicting the future - Models and Forecasting of Precipitation***

To "accurately" model/forecast precipitation requires predicting the movement of the seven (7) major air masses surrounding North America.

The Test: *Compare various predictive models of precipitation for the six (6) months from October 2020 thru March 2021* ***versus*** *traditional forecasts using the actual historical record.*



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Precipitation forecasts by various major computer models were laid over the top of Historical Precipitation colored data ranges, in order visualize and compare a wide range of data set outcomes for Lake Ontario.

What does this all mean? In simpler terms, the cumulative results, from all the models' predictions, is a wider range of possible precipitations than has ***historically*** ever been seen before in each of the months (except October). (Note the "O" symbols) These model-based precipitation forecasts could **either be less than or greater than *ever seen before***. So how in the world could anyone accurately predict what Lake Ontario/St. Lawrence River levels will be? In the words of Dr. Gronewald, there is…. "not a chance….." …. at least at the seasonal scale level.

What is also becoming clearer however, is that all models are pointing to either higher temperature and/or precipitation over time….and these swings will make for more rapid changes in water levels AND occur more often. No matter what was seen in the past, what regulation plan is in effect, *we should expect a wide range of levels now and in the future.*

3) The Water Levels Strategy for Fall Haul-out, Raising Lake St. Lawrence

See the ILOSLRB's announcement HERE. We'll talk more next month about how this action has very little impact on our water levels in the Thousand Islands with the actual numbers.